IN THE CLAIMS

For the convenience of the Examiner, all pending claims of the present Application are shown below in numerical order whether or not an amendment has been made and applying the revised format guidelines of 37 CFR 1.121.

1. **(Original)** An apparatus operable to convert wavelengths of a plurality of optical signals, the apparatus comprising:

a coupler operable to receive a pump signal and a plurality of input signals each input signal comprising at least one wavelength different than the wavelengths of others of the plurality of input optical signals;

an optical medium operable to receive the pump signal and the plurality of input signals from the coupler, wherein the pump signal and each of the plurality of input signals are synchronized to overlap at least partially during at least a part of the time spent traversing the optical medium to facilitate generation of a plurality of converted wavelength signals each comprising a wavelength that is different than the wavelengths of at least some of the plurality of input signals;

wherein a cross-talk between the converted wavelength signals comprises less than minus fourteen decibels (-14 dB) over a wavelength range of at least seven (7) nanometers or wherein a polarization sensitivity of the converter is less than 1.2 decibels over a wavelength range of at least seven (7) nanometers.

2. **(Original)** The apparatus of Claim 1, wherein the coupler comprises a wavelength division multiplexer.

3. **(Original)** The apparatus of Claim 1, wherein the optical medium is coupled directly to the coupler.

4. **(Original)** The apparatus of Claim 1, wherein the plurality of input signals comprise signals in a first band of wavelengths and wherein the plurality of converted wavelength signals comprise signals in a second band of wavelengths.

5. **(Original)** The apparatus of Claim 4, wherein the first band comprises the conventional band (C-band) of wavelengths and wherein the second band comprises either the short band (S-band) or the long band (L-band) of wavelengths.

6. **(Original)** The apparatus of Claim 1, wherein a wavelength of the pump signal resides spectrally between wavelengths of at least some of the plurality of input signals and wavelengths of at least some of the plurality of converted wavelength signals.

7. **(Original)** The apparatus of Claim 6, wherein the spectrum of the plurality of converted wavelength signals comprises an approximate mirror image of the spectrum of the plurality of input signals.

8. **(Original)** The apparatus of Claim 1, wherein the optical medium comprises a medium operable to facilitate a Chi-3 or an effective Chi-3 nonlinear effect resulting in generation of the converted wavelength signals comprising instances of the optical input signals reflected about a wavelength of the pump signal.

9. **(Original)** The apparatus of Claim 8, wherein the Chi-3 or effective Chi-3 nonlinear effect comprises parametric amplification, modulation instability, or four wave mixing.

10. **(Original)** The apparatus of Claim 1, wherein the optical medium comprises a propagation length selected to result in a conversion efficiency of at least 4.7 decibels and a cross talk of -27 decibels or less in the converted wavelength signals over a wavelength range of at least 30 nanometers.

11. **(Original)** The apparatus of Claim 1, wherein the optical medium comprises a first end and a second end, and wherein the coupler comprises a polarization beam splitter coupled between the first end and the second end of the optical medium, the polarization beam splitter operable to communicate portions of received signals having a first polarization in one direction through the optical medium and to c mmunicate portions of the received signals having a second polarization in a second direction through the optical medium.

12. **(Currently Amended)** The apparatus of ~~Claim 1~~ Claim 11, wherein the optical medium facilitates generation of the plurality of converted wavelength signals through at least substantially unidirectional interaction between portions of the pump signal and input signals having the first polarization and at least substantially unidirectional interaction between portions of the pump signal and input signals having the second polarization.

13. **(Original)** The apparatus of Claim 1, wherein the polarization sensitivity comprises 0.6 decibels or less over a wavelength range of at least 35 nanometers.

14. **(Currently Amended)** A multiple wavelength converter, comprising:

a coupler operable to receive a pump signal and a plurality of input optical signals each having at least one wavelength distinct from wavelengths of others of the plurality of input optical signals;

a nonlinear optical medium operable to facilitate interaction between the pump signal and the plurality of input optical signals to generate a plurality of converted wavelength optical signals each comprising a wavelength different than at least some of the wavelengths of the plurality of input optical signals;

wherein the nonlinear optical medium comprises a propagation length selected to result in conversion efficiency of at least minus sixteen decibels (-16 dB) and a cross-talk associated with the converted wavelength optical signals of minus fourteen decibels (-14 dB) or less ~~and a~~ over a wavelength range of at least seven (7) nanometers.

15. **(Original)** The multiple wavelength converter of Claim 14, wherein the coupler comprises a wavelength division multiplexer.

16. **(Original)** The multiple wavelength converter of Claim 14, wherein the plurality of input signals comprise signals in a first band of wavelengths and wherein the plurality of converted wavelength signals comprise signals in a second band of wavelengths.

17. **(Original)** The multiple wavelength converter of Claim 16, wherein the first band comprises the conventional band (C-band) of wavelengths and wherein the second band comprises either the short band (S-band) or the long band (L-band) of wavelengths.

18. **(Original)** The multiple wavelength converter of Claim 14, wherein the optical medium comprises a medium operable to facilitate a Chi-3 or effective Chi-3 nonlinear effect resulting in generation of the converted wavelength signals comprising instances of the optical input signals reflected about a wavelength of the pump signal.

19. **(Original)** The multiple wavelength converter of Claim 18, wherein the Chi-3 or effective Chi-3 nonlinear effect comprises parametric amplification, modulation instability, or four wave mixing.

20. **(Original)** The multiple wavelength converter of Claim 14, wherein the optical medium comprises a first end and a second end, and wherein the coupler comprises a polarization beam splitter coupled between the first end and the second end of the optical medium, the polarization beam splitter operable to communicate portions of received signals having a first polarization in one direction through the optical medium and to communicate portions of the received signals having a second polarization in a second direction through the optical medium.

21. **(Currently Amended)** The multiple wavelength converter of ~~Claim 14~~ Claim 20, wherein the optical medium facilitates generation of the plurality of converted wavelength signals through at least substantially unidirectional interaction between portions of the pump signal and input signals having the first polarization and at least substantially unidirectional interaction between portions of the pump signal and input signals having the second polarization.

22. **(Original)** The multiple wavelength converter of Claim 14, wherein the conversion efficiency comprises at least 4.7 decibels and wherein the cross-talk comprises less than minus twenty-seven decibels (–27 dB) over a wavelength range of at least thirty (30) nanometers.

23. **(Original)** A multiple wavelength converter, comprising:

a polarization beam splitter operable to receive a plurality of input optical signals and to communicate a first portion of each of the plurality of input optical signals comprising a first polarization in one direction, and to communicate a second portion of each of the plurality of input optical signals comprising a second polarization in a second direction;

an optical medium operable to propagate a first pump signal comprising approximately the first polarization and the first portions of the input signals in a first direction, and to propagate a second pump signal comprising approximately the second polarization and the second portions of the input signals in a second direction;

wherein the optical medium facilitates at least substantially unidirectional interaction between the first portions of the input signals and the first pump signal and between the second portions of the input signals and the second pump signal to generate first portions and second portions of a plurality of converted wavelength signals; and

wherein the polarization beam splitter is operable to receive and combine the first and second portions of the plurality of converted wavelength signals to form a plurality of converted wavelength signals.

24. **(Original)** The multiple wavelength converter of Claim 23, wherein the plurality of input signals comprise signals in a first band of wavelengths and wherein the plurality of converted wavelength signals comprise signals in a second band of wavelengths.

25. **(Original)** The multiple wavelength converter of Claim 23, wherein a wavelength of the pump signal resides spectrally between wavelengths of at least some of the plurality of input signals and wavelengths of at least some of the plurality of converted wavelength signals.

26. **(Original)** The multiple wavelength converter of Claim 23, wherein the optical medium comprises a medium operable to facilitate a Chi-3 or effective Chi-3 nonlinear effect resulting in generation of the converted wavelength signals comprising instances of the optical input signals reflected about a wavelength of the pump signal.

27. **(Original)** The multiple wavelength converter of Claim 26, wherein the Chi-3 or effective Chi-3 nonlinear effect comprises parametric amplification, modulation instability, or four wave mixing.

28. **(Original)** The multiple wavelength converter of Claim 23, wherein the optical medium comprises a propagation length selected to result in a cross talk of less than minus fourteen (-14) decibels over a wavelength range of at least seven (7) nanometers.

29. **(Original)** The multiple wavelength converter of Claim 23, wherein the optical medium comprises a propagation length selected to result in a cross talk of less than minus twenty-seven (-27) decibels over a wavelength range of at least thirty (30) nanometers.

30. **(Original)** The multiple wavelength converter of Claim 23, wherein the optical medium comprises a polarization maintaining fiber.

31. **(Original)** The multiple wavelength converter of Claim 23, further comprising a polarization controller coupled to the optical medium and operable to facilitate directing at least substantially all of the converted wavelength signals from a single output port of the polarization beam splitter.

32. **(Original)** The multiple wavelength converter of Claim 31, wherein the single output port comprises the input port that receives the plurality of input optical signals, and further comprising a circulator operable to direct the converted wavelength signals from the path of the input optical signals.

33. **(Original)** The multiple wavelength converter of Claim 23, wherein the first pump signal and the second pump signal comprise approximately orthogonally polarized portions separated from a pump signal generated by a single pump source.

34. **(Original)** The multiple wavelength converter of Claim 23, wherein the first pump signal and the second pump signal comprise pump signals generated at separat pump sources.

35. **(Original)** The multiple wavelength converter of Claim 23, further comprising a first optical coupler and a second optical coupler each residing between the polarization beam splitter and an end of the optical medium, wherein each optical coupler is operable to introduce one of the pump signals to the optical medium.

36. **(Original)** The multiple wavelength converter of Claim 23, wherein a polarization sensitivity of the converter comprises less than 1.2 decibels over a wavelength range of at least 7 nanometers.

37. **(Original)** The multiple wavelength converter of Claim 23, wherein a polarization sensitivity of the converter comprises 0.6 decibels or less over a wavelength range of at least 35 nanometers.

38. **(Currently Amended)** A multiple wavelength converter, comprising:

an optical gain medium comprising:

a first end operable to receive from a polarization beam splitter first portions of a plurality of input optical signals and a first pump signal, each of the first portions and the first pump signal comprising at least substantially a first polarization; and

a second end operable to receive second portions of the plurality of input optical signals and a second pump signal, the second portions and the second pump signal comprising at least substantially a second polarization approximately orthogonal to the first polarization;

wherein the optical gain medium is operable to facilitate at least substantially unidirectional interaction between the first portions and the first pump signal to generate first portions of a plurality of converted wavelength signals, and to facilitate at least substantially unidirectional interaction between the second portions and the second pump signal to generate second portions of the plurality of converted wavelength signals, wherein the first and second portions of the plurality of converted wavelength signals are operable to be combined by the polarization beam splitter to form a plurality of converted wavelength signals.

39. **(Original)** The multiple wavelength converter of Claim 38, wherein the plurality of input signals comprise signals in a first band of wavelengths and wherein the plurality of converted wavelength signals comprise signals in a second band of wavelengths.

40. **(Original)** The multiple wavelength converter of Claim 38, wherein the optical medium comprises a medium operable to facilitate a Chi-3 or effective Chi-3 nonlinear effect resulting in generation of the converted wavelength signals comprising instances of the optical input signals reflected about a wavelength of the pump signal.

41. **(Original)** The multiple wavelength converter of Claim 38, wherein the optical medium comprises a propagation length selected to result in a cross talk of less than minus fourteen (-14) decibels over a wavelength range of at least seven (7) nanometers.

42. **(Original)** The multiple wavelength converter of Claim 38, wherein the optical medium comprises a propagation length selected to result in a cross talk of less than minus twenty-seven (-27) decibels over a wavelength range of at least thirty nanometers.

43. **(Original)** The multiple wavelength converter of Claim 38, wherein the optical medium comprises a polarization maintaining fiber.

44. **(Original)** The multiple wavelength converter of Claim 38, further comprising a polarization controller coupled to the optical medium and operable to facilitate directing at least substantially all of the converted wavelength signals from a single output port of the polarization beam splitter.

45. **(Original)** The multiple wavelength converter of Claim 44, wherein the single output port comprises the input port that receives the plurality of input optical signals, and further comprising a circulator operable to direct the converted wavelength signals from the path of the input optical signals.

46. **(Original)** The multiple wavelength converter of Claim 38, wherein the first pump signal and the second pump signal comprise approximately orthogonally polarized portions separated from a pump signal generated by a single pump source.

47. **(Original)** The multiple wavelength converter of Claim 38, further comprising a first optical coupler and a second optical coupler each residing between the polarization beam splitter and an end of the optical medium, wherein each optical coupler is operable to introduce one of the pump signals to the optical medium.

48. **(Original)** The multiple wavelength converter of Claim 38, wherein a polarization sensitivity of the converter comprises less than 1.2 decibels over a wavelength range of at least 7 nanometers.

49. **(Original)** The multiple wavelength converter of Claim 38, wherein a polarization sensitivity of the converter comprises 0.6 decibels or less over a wavelength range of at least 35 nanometers.

50. **(Original)** The multiple wavelength converter of Claim 38, wherein the polarization beam splitter comprises:

a first port operable to receive the pump signal and a plurality of input optical signals;

a second port operable to communicate toward the first end of the optical medium the first portions of the pump signal and the plurality of input optical signals, and to receive from the second end of the optical medium the second portions of the plurality of converted wavelength optical signals;

a third port operable to communicate toward the second end of the optical medium the second portions of the pump signal and the plurality of input optical signals, and to receive from the first end of the optical medium the first portions of the plurality of converted wavelength optical signals; and

a fourth port operable to communicate the plurality of converted wavelength optical signals.

51. **(Original)** A system operable to generate a plurality of optical signals each having at least one distinct wavelength, the system comprising:

a plurality of optical transmitters each operable to generate one of a plurality of optical input signals each comprising a wavelength in a first subset of wavelengths; and

a multiple wavelength converter coupled to the plurality of optical transmitters and operable to approximately simultaneously generate, for each of the plurality of optical input signals, a converted wavelength signal comprising a wavelength in a second subset of wavelengths;

wherein a cross-talk between the converted wavelength signals comprises less than minus fourteen decibels (-14 dB) over a wavelength range of at least seven (7) nanometers or wherein a polarization sensitivity of the converter is less than 1.2 decibels over a wavelength range of at least seven (7) nanometers.

52. **(Original)** The system of Claim 51, wherein the first subset of wavelengths resides within a first communications band and wherein the second subset of wavelengths resides within a second communications band.

53. **(Original)** The system of Claim 52, wherein the first communications band comprises the conventional band (C-band) of wavelengths and wherein the second communications band comprises either the short band (S-band) or the long band (L-band) of wavelengths.

54. **(Original)** The system of Claim 51, wherein the multiple wavelength converter comprises an optical medium operable to receive a pump signal and the plurality of input signals, wherein the pump signal and each of the plurality of input signals are synchronized to overlap at least partially during at least a part of the time spent traversing the optical medium to facilitate generation of the plurality of converted wavelength signals.

55. **(Original)** The system of Claim 54, wherein the optical medium comprises a medium operable to facilitate a Chi-3 or effective Chi-3 nonlinear effect resulting in generation of the converted wavelength signals comprising instances of the optical input signals reflected about a wavelength of the pump signal.

56. **(Original)** The system of Claim 54, wherein the optical medium comprises a propagation length selected to result in a cross talk of minus twenty-seven (-27) decibels or less in the converted wavelength signals over a wavelength range of at least seven (7) nanometers.

57. **(Currently Amended)** The system of Claim 51, wherein the multiple wavelength converter comprises an optical <u>gain</u> medium comprising:

a first end operable to receive from a polarization beam splitter first portions of a plurality of input optical signals and a first pump signal, each of the first portions and the first pump signal comprising at least substantially a first polarization; and

a second end operable to receive second portions of the plurality of input optical signals and a second pump signal, the second portions and the second pump signal comprising at least substantially a second polarization approximately orthogonal to the first polarization;

wherein the optical gain medium is operable to facilitate at least substantially unidirectional interaction between the first portions and the first pump signal and between the second portions and the second pump signal to facilitate generation of the plurality of converted wavelength signals.

58. **(Original)** The system of Claim 57, wherein the optical medium comprises a polarization maintaining fiber.

59. **(Original)** The system of Claim 57, further comprising a polarization controller coupled to the optical medium and operable to facilitate directing at least substantially all of the converted wavelength signals from a single output port of the polarization beam splitter.

60. **(Original)** The system of Claim 59, wherein the single output port comprises the input port that receives the plurality of input optical signals, and further comprising a circulator operable to direct the converted wavelength signals from th path of the input optical signals.

61. **(Currently Amended)** The ~~multiple wavelength converter~~ system of Claim 51, wherein a polarization sensitivity of the converter comprises 0.6 decibels or less over a wavelength range of at least 35 nanometers.

62. **(Currently Amended)** A system operable to convert a plurality of wavelengths, the system comprising:

one or more optical transmitters operable to generate alone or in combination a plurality of optical input signals each comprising a wavelength in a first communications band; and

a multiple wavelength converter coupled to the one or more optical transmitters and operable to ~~approximately simultaneously~~ generate, for each of the plurality of optical input signals, a converted wavelength signal comprising a wavelength in a second communications band;

wherein the multiple wavelength converter comprises an optical fiber having a propagation length and a zero dispersion wavelength, the optical fiber operable to receive a pump signal having a pump wavelength, the propagation length and a spectral relationship between the zero dispersion wavelength and the pump wavelength at least partially determining the amplitudes of the plurality of converted wavelength signals.

63. **(Original)** The system of Claim 62, wherein the first communications band comprises the conventional band (C-band) of wavelengths and wherein the second communications band comprises either the short band (S-band) or the long band (L-band) of wavelengths.

64. **(Original)** The system of Claim 62, wherein a cross-talk between the converted wavelength signals comprises less than minus fourteen decibels (-14 dB) over a wavelength range of at least seven (7) nanometers or wherein a polarization sensitivity of the converter is less than 1.2 decibels over a wavelength range of at least seven (7) nanometers.

65. **(Original)** The system of Claim 62, wherein the multiple wavelength converter comprises an optical medium operable to receive a pump signal and the plurality of input signals, wherein the pump signal and each of the plurality of input signals are synchronized to overlap at least partially during at least a part of the time spent traversing the optical medium to facilitate generation of the plurality of converted wavelength signals.

66. **(Currently Amended)** The system of Claim 62, wherein the multiple wavelength converter comprises an optical gain medium comprising:

a first end operable to receive from a polarization beam splitter first portions of a plurality of input optical signals and a first pump signal, each of the first portions and the first pump signal comprising at least substantially a first polarization; and

a second end operable to receive second portions of the plurality of input optical signals and a second pump signal, the second portions and the second pump signal comprising at least substantially a second polarization approximately orthogonal to the first polarization;

wherein the optical gain medium is operable to facilitate at least substantially unidirectional interaction between the first portions and the first pump signal and between the second portions and the second pump signal to facilitate generation of the plurality of converted wavelength signals.

67. **(Currently Amended)** The system of ~~Claim 62~~ Claim 66, wherein the optical medium comprises a propagation length selected to result in a cross talk of minus twenty-seven (-27) decibels or less in the converted wavelength signals over a wavelength range of at least seven (7) nanometers.

68. **(Original)** The system of Claim 62, wherein a polarization sensitivity of the converter comprises 0.6 decibels or less over a wavelength range of at least 35 nanometers.

69. **(Original)** A system operable to convert a plurality of wavelengths to facilitate protection switching, the system comprising:

an optical medium operable to communicate optical signals comprising wavelengths residing in a first set of wavelengths or a second set of wavelengths;

a multiple wavelength converter coupled to the optical medium, the multiple wavelength converter operable to receive a plurality of optical signals each comprising a wavelength in the first set of wavelengths and to approximately simultaneously generate, for each of the plurality of optical signals, a converted wavelength signal comprising a wavelength in the second set of wavelengths;

wherein the second set of wavelengths comprises a protection path for the first set of wavelengths operable to be utilized in the event of detection of a fault associated with a communication path carrying optical signals comprising wavelengths from the first set of wavelengths or a fault associated with the optical signals.

70. **(Original)** The system of Claim 69, wherein the optical medium comprises:

a first optical medium operable to communicate signals comprising wavelengths in the first set of wavelengths; and

a second optical medium operable to communicate signals comprising wavelengths in the second set of wavelengths.

71. **(Original)** The system of Claim 70, wherein the first and second optical media comprise physically distinct media from one another.

72. **(Original)** The system of Claim 69, wherein the first set of wavelengths resides in the conventional communications band and wherein the second set of wavelengths resides in either the short communications band (S-band) or the long communications band (L-band) of wavelengths.

73. **(Original)** The system of Claim 69, wherein the wavelength converter is operable to generate the converted wavelength signals in response to a fault detected.

74. **(Original)** The system of Claim 69, wherein a cross-talk between the converted wavelength signals comprises less than minus fourteen decibels (-14 dB) over a wavelength range of at least seven (7) nanometers or wherein a polarization sensitivity of the converter is less than 1.2 decibels over a wavelength range of at least seven (7) nanometers.

75. **(Original)** The system of Claim 69, wherein the multiple wavelength converter comprises an optical medium operable to receive a pump signal and the plurality of input signals, wherein the pump signal and each of the plurality of input signals are synchronized to overlap at least partially during at least a part of the time spent traversing the optical medium to facilitate generation of the plurality of converted wavelength signals.

76. **(Currently Amended)** The system of Claim 69, wherein the multiple wavelength converter comprises an optical <u>gain</u> medium comprising:

a first end operable to receive from a polarization beam splitter first portions of a plurality of input optical signals and a first pump signal, each of the first portions and the first pump signal comprising at least substantially a first polarization; and

a second end operable to receive second portions of the plurality of input optical signals and a second pump signal, the second portions and the second pump signal comprising at least substantially a second polarization approximately orthogonal to the first polarization;

wherein the optical gain medium is operable to facilitate at least substantially unidirectional interaction between the first portions and the first pump signal and between the second portions and the second pump signal to facilitate generation of the plurality of converted wavelength signals.

77. **(Original)** The system of Claim 69, wherein the optical medium comprises a propagation length selected to result in a cross talk of minus twenty-seven (-27) decibels or less in the converted wavelength signals over a wavelength range of at least seven (7) nanometers.

78. **(Original)** The system of Claim 69, wherein a polarization sensitivity of the converter comprises 0.6 d cibels or less over a wavelength rang of at least 35 nanometers.

79. **(Original)** A method of generating a plurality of converted wavelength signals, comprising:

receiving a plurality of optical input signals each comprising at least one distinct wavelength;

receiving a pump signal comprising a pump wavelength that is either shorter or longer than each of the wavelengths of the plurality of input optical signals;

copropagating the plurality of input optical signals and the pump signal over a nonlinear optical medium;

generating a plurality of converted wavelength signals based on an interaction between the plurality of input optical signals and the pump signal;

wherein a cross-talk between the converted wavelength signals comprises less than minus fourteen decibels (-14 dB) over a wavelength range of at least seven (7) nanometers or wherein a polarization sensitivity associated with the converted wavelength signals is less than 1.2 decibels over a wavelength range of at least seven (7) nanometers.

80. **(Original)** The method of Claim 79, wherein the plurality of input signals comprise signals in a first band of wavelengths and wherein the plurality of converted wavelength signals comprise signals in a second band of wavelengths.

81. **(Original)** The method of Claim 80, wherein the first band comprises the conventional band (C-band) of wavelengths and wherein the second band comprises either the short band (S-band) or the long band (L-band) of wavelengths.

82. **(Original)** The method of Claim 79, wherein the optical medium comprises a medium operable to facilitate a Chi-3 or effective Chi-3 nonlinear effect.

83. **(Original)** The method of Claim 82, wherein the Chi-3 or effective Chi-3 nonlinear effect comprises parametric amplification, modulation instability or four wave mixing.

84. **(Original)** The method of Claim 79, wherein the optical medium comprises a propagation length selected to result in a conversion efficiency of at least 4.7 decibels and a cross talk of -27 decibels or less in the converted wavelength signals over a wavelength range of at least 30 nanometers.

85. **(Original)** The method of Claim 79, wherein receiving a plurality of optical input signals comprises:

receiving the plurality of optical input signals at a polarization beam splitter; and

separating each of the plurality of optical input signals into a first portion comprising a first polarization and a second portion comprising a second polarization.

86. **(Original)** The method of Claim 85, wherein receiving a pump signal comprises:

receiving the pump signal at a polarization beam splitter; and

separating the pump signal into a first pump signal comprising a first polarization and a second pump signal comprising a second polarization.

87. **(Original)** The method of Claim 86, wherein copropagating the plurality of input optical signals and the pump signal over a nonlinear optical medium comprises:

propagating the first portions and the first pump signal in one direction through the optical medium; and

propagating the second portions and the second pump signal in a second direction opposite the first direction through the optical medium.

88. **(Original)** The method of Claim 79, wherein a polarization sensitivity associated with the converted wavelengths comprises 0.6 decibels or less over a wavelength range of at least 35 nanometers.

89. **(Original)** A method of generating a plurality of converted wavelength signals, comprising:

receiving a plurality of optical input signals each comprising at least one distinct wavelength;

receiving a pump signal comprising a pump wavelength that is either shorter or longer than each of the wavelengths of the plurality of input optical signals;

copropagating the plurality of input optical signals and the pump signal over a nonlinear optical medium, the nonlinear medium comprising a propagation length;

generating a plurality of converted wavelength signals based on an interaction between the plurality of input optical signals and the pump signal;

wherein the propagation length of the optical medium is selected to result in a conversion efficiency of at least minus sixteen (-16) decibels and a cross talk of minus fourteen (-14) decibels or less in the converted wavelength signals over a wavelength range of at least seven (7) nanometers.

90. **(Original)** The method of Claim 89, wherein the plurality of input signals comprise signals in a first band of wavelengths and wherein the plurality of converted wavelength signals comprise signals in a second band of wavelengths.

91. **(Original)** The method of Claim 89, wherein receiving a plurality of optical input signals comprises:

receiving the plurality of optical input signals at a polarization beam splitter; and

separating each of the plurality of optical input signals into a first portion comprising a first polarization and a second portion comprising a second polarization.

92. **(Original)** The method of Claim 91, wherein receiving a pump signal comprises:

receiving the pump signal at a polarization beam splitter; and

separating the pump signal into a first pump signal comprising a first polarization and a second pump signal comprising a second polarization.

93. **(Original)** The method of Claim 92, wherein copropagating the plurality of input optical signals and the pump signal over a nonlinear optical medium comprises:

propagating the first portions and the first pump signal in one direction through the optical medium; and

propagating the second portions and the second pump signal in a second direction opposite the first direction through the optical medium.

94. **(Original)** The method of Claim 89, wherein the optical medium comprises a propagation length selected to result in a conversion efficiency of at least 4.7 decibels and a cross talk of -27 decibels or less in the converted wavelength signals over a wavelength range of at least 30 nanometers.

95. **(Original)** The method of Claim 89, wherein a polarization sensitivity associated with the converted wavelengths comprises 0.6 decibels or less over a wavelength range of at least 35 nanometers.

96. **(Currently Amended)** A method of generating a plurality of converted wavelength signals, comprising:

receiving at a polarization beam splitter a plurality of optical input signals each comprising at least one distinct wavelength;

separating each of the plurality of optical input signals into a first portion comprising a first polarization and a second portion comprising a second polarization;

copropagating the first portions and a first pump signal in a first direction along a nonlinear optical medium, wherein an interaction between the first pump signal and the first portions results in generation of first portions of converted wavelength signals;

copropagating the second portions and a second pump signal in a second <u>direction</u> opposite the first direction along the nonlinear optical medium, wherein an interaction between the second pump signal and the second portions results in generation of second portions of converted wavelength signals; and

combining the first and second portions of the converted wavelength signals at the polarization beam splitter to form a plurality of converted wavelength signals.

97. **(Original)** The method of Claim 96, wherein the plurality of input signals comprise signals in a first band of wavelengths and wherein the plurality of converted wavelength signals comprise signals in a second band of wavelengths.

98. **(Original)** The method of Claim 96, wherein the optical medium comprises a propagation length selected to result in a conversion efficiency of at least minus sixteen (-16) decibels and a cross talk of minus fourteen (-14) decibels or less in the converted wavelength signals over a wavelength range of at least seven (7) nanometers.

99. **(Original)** The method of Claim 96, wherein the optical medium comprises a polarization maintaining fiber.

100. **(Original)** The method of Claim 96, wherein copropagating the first portions and the first pump signal and copropagating the second portions and the second pump signal comprises controlling the polarization of the first and second portions and the first and second pump signals to direct at least substantially all of the converted wavelength signals from a single output port of the polarization beam splitter.

101. **(Currently Amended)** The method of Claim 100, wherein the single output port comprises the input port that receives the plurality of input optical signals, and further ~~comprising a~~ <u>comprising</u> redirecting the converted wavelength signals leaving the output port from the path of the input optical signals.

102. **(Original)** The method of Claim 96, wherein copropagating the first portions and the first pump signal and copropagating the second portions and the second pump signal comprises introducing the first and second pump signals to the optical medium without passing the first and second pump signals through the polarization beam splitter.

103. **(Original)** The method of Claim 96, wherein the first pump signal and the second pump signal comprise approximately orthogonally polarized portions separated from a pump signal generated by a single pump source.

104. **(Original)** The method of Claim 96, wherein the first pump signal and the second pump signal comprise pump signals generated at separate pump sources.

105. **(Original)** The method of Claim 96, wherein a polarization sensitivity associated with the converted wavelengths comprises less than 1.2 decibels or less over a wavelength range of at least 7 nanometers.

106. **(Original)** The method of Claim 96, wherein a polarization sensitivity associated with the converted wavelengths comprises 0.6 decibels or less over a wavelength range of at least 35 nanometers.

107. **(Currently Amended)** A method of generating a plurality of converted wavelength signals, comprising:

receiving a plurality of optical input signals each comprising at least one distinct wavelength residing in a first communications band;

receiving a pump signal comprising a pump wavelength that is either shorter or longer than each of the wavelengths of the plurality of input optical signals;

copropagating the plurality of input optical signals and the pump signal over a nonlinear optical medium, the nonlinear optical medium comprising an optical fiber having a propagation length and a zero dispersion wavelength associated with the optical fiber; and

generating a plurality of converted wavelength signals based on an interaction between the plurality of input optical signals and the pump signal, wherein the plurality of converted wavelength signals reside in a second communications band, wherein the propagation length and a spectral relationship between the zero dispersion wavelength and the pump wavelength at least partially determines the amplitudes of the plurality of converted wavelength signals.

108. **(Original)** The method of Claim 107, wherein a cross-talk between the converted wavelength signals comprises less than minus fourteen decibels (-14 dB) over a wavelength range of at least seven (7) nanometers or wherein a polarization sensitivity associated with the converted wavelength signals is less than 1.2 decibels over a wavelength range of at least seven (7) nanometers.

109. **(Original)** The method of Claim 107, wherein the first band comprises the conventional band (C-band) of wavelengths and wherein the second band comprises either the short band (S-band) or the long band (L-band) of wavelengths.

110. **(Original)** The method of Claim 107, wherein receiving a plurality of optical input signals comprises:

receiving the plurality of optical input signals at a polarization beam splitter; and

separating each of the plurality of optical input signals into a first portion comprising a first polarization and a second portion comprising a second polarization.

111. **(Original)** The method of Claim 110, wherein receiving a pump signal comprises:

receiving the pump signal at a polarization beam splitter; and

separating the pump signal into a first pump signal comprising a first polarization and a second pump signal comprising a second polarization.

112. **(Original)** The method of Claim 111, wherein copropagating the plurality of input optical signals and the pump signal over a nonlinear optical medium comprises:

propagating the first portions and the first pump signal in one direction through the optical medium; and

propagating the second portions and the second pump signal in a second direction opposite the first direction through the optical medium.

113. **(Original)** The method of Claim 107, wherein the optical medium comprises a propagation length selected to result in a conversion efficiency associated with the converted wavelength signals of at least 4.7 decibels and a cross-talk associated with the converted wavelength signals of -27 decibels or less over a wavelength range of at least thirty 30 nanometers.

114. **(Original)** The method of Claim 82, wherein a polarization sensitivity associated with the converted wavelengths comprises less than 0.6 decibels or less over a wavelength range of at least 35 nanometers.

115. **(Original)** A method of protection switching, comprising:

receiving a plurality of optical input signals each comprising at least one distinct wavelength residing in a first set of wavelengths associated with a first communication path;

receiving a pump signal comprising a pump wavelength that is either shorter or longer than each of the wavelengths of the plurality of input optical signals;

detecting a fault associated with the first communication path;

copropagating the plurality of input optical signals and the pump signal over a nonlinear optical medium;

generating a plurality of converted wavelength signals based on an interaction between the plurality of input optical signals and the pump signal, wherein the plurality of converted wavelength signals reside in a second set of wavelengths associated with a second communication path; and

in response to detecting the fault, communicating the plurality of converted wavelength signals over the second communications path.

116. **(Original)** The method of Claim 115, wherein a cross-talk between the converted wavelength signals comprises less than minus fourteen decibels (-14 dB) over a wavelength range of at least seven (7) nanometers or wherein a polarization sensitivity associated with the converted wavelength signals is less than 1.2 decibels over a wavelength range of at least seven (7) nanometers.

117. **(Currently Amended)** The method of Claim 115, wherein the first ~~band~~ set comprises the conventional band (C-band) of wavelengths and wherein the second ~~band~~ set comprises either the short band (S-band) or the long band (L-band) of wavelengths.

118. **(Original)** The method of Claim 115, wherein receiving a plurality of optical input signals comprises:

receiving the plurality of optical input signals at a polarization beam splitter; and

separating each of the plurality of optical input signals into a first portion comprising a first polarization and a second portion comprising a second polarization.

119. **(Original)** The method of Claim 118, wherein receiving a pump signal comprises:

receiving the pump signal at a polarization beam splitter; and

separating the pump signal into a first pump signal comprising a first polarization and a second pump signal comprising a second polarization.

120. **(Original)** The method of Claim 119, wherein copropagating the plurality of input optical signals and the pump signal over a nonlinear optical medium comprises:

propagating the first portions and the first pump signal in one direction through the optical medium; and

propagating the second portions and the second pump signal in a second direction opposite the first direction through the optical medium.

121. **(Original)** The method of Claim 115, wherein the optical medium comprises a propagation length selected to result in a conversion efficiency associated with the converted wavelength signals of at least 4.7 decibels and a cross-talk associated with the converted wavelength signals of minus twenty-seven (-27) decibels or less over a wavelength range of at least thirty (30) nanometers.

122. **(Original)** The method of Claim 115, wherein a polarization sensitivity associated with the converted wavelengths comprises less than 0.6 decibels or less over a wavelength range of at least 35 nanometers.

123. **(Original)** The method of Claim 115, wherein generating the plurality of converted wavelength signals comprises generating the plurality of converted wavelength signals after a fault has been detected.

124. **(New)** The system of Claim 62, wherein the optical fiber is operable to facilitate a Chi-3 or effective Chi-3 nonlinear effect resulting in generation of the converted wavelength signals comprising instances of the optical input signals reflected about a wavelength of a pump signal.

125. (New) The system of Claim 62, wherein the propagation length is at least 300 meters.

126. (New) The system of Claim 62, wherein the pump wavelength is close to the zero-dispersion wavelength.

127. (New) The system of Claim 62, wherein the pump wavelength is within 2 nanometers of the zero-dispersion wavelength.

128. (New) The system of Claim 62, wherein the pump wavelength is greater than the zero-dispersion wavelength.

129. (New) The system of Claim 124, wherein the pump wavelength is greater than the zero-dispersion wavelength and wherein the Chi-3 nonlinear effect comprises parametric amplification or modulation instability.

130. (New) The method of Claim 107, wherein the optical fiber is operable to facilitate a Chi-3 or effective Chi-3 nonlinear effect resulting in generation of the converted wavelength signals comprising instances of the optical input signals reflected about a wavelength of a pump signal.

131. (New) The method of Claim 107, wherein the propagation length is at least 300 meters.

132. (New) The method of Claim 107, wherein the pump wavelength is close to the zero-dispersion wavelength.

133. (New) The method of Claim 107, wherein the pump wavelength is within 2 nanometers of the zero-dispersion wavelength.

134. (New) The method of Claim 107, wherein the pump wavelength is greater than the zero-dispersion wavelength.

135. (New) The method of Claim 130, wherein the pump wavelength is greater than the zero-dispersion wavelength and wherein the Chi-3 nonlinear effect comprises parametric amplification or modulation intensity.